MCO 188

HOSPITAL TECHNICAL MEMORANDUM

PLANNED PREVENTIVE MAINTENANCE:

A SYSTEM FOR ENGINEERING PLANT AND SERVICES

13

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Planned Preventive Maintenance: A System for Engineering Plant and Services

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This Memorandum should be read in conjunction with Hospital Technical Memorandum No. 12 on maintenance generally, prepared by the Hospital O & M Service, entitled Maintenance of Buildings, Plant and Equipment, which discusses in some detail the nature and the advantages of planned maintenance in hospitals.

I. Introduction

The amount, complexity and cost of engineering plant, services and equipment, and building works in modern hospitals (and their place in medical treatment) point to the need for systematic examination and routine maintenance to be done in accordance with a programme, devised to suit the individual hospital.

This Memorandum describes a system of planned maintenance for engineering services. A major objective of this system is to ensure that more than one trade can carry out work within a department simultaneously. In this way the minimum amount of inconvenience is caused. The Memorandum describes how this can be achieved in respect of engineering services; it is incumbent upon the hospital to ensure that the major parts of the engineering servicing programme are carried forward with building maintenance wherever possible, so that both building and engineering maintenance works involving several trades can be carried out together.

The system described in this Memorandum is based on one already in use in the government service, modified to suit hospital arrangements and conditions. These particular features are the result of experience gained in constructing and operating for a year a pilot scheme, in which the Board of Governors of St. George's Hospital, London, co-operated with the Engineering Division of the Ministry.

The Ministry is grateful for this practical assistance and also for that given by other hospital authorities who have introduced pilot schemes. Individual hospital engineers also have offered valuable suggestions and have assisted with the mechanics' manuals.

The Ministry commends the system here described to hospitals which decide to adopt planned preventive maintenance because it has shown itself to be comprehensive, adaptable, easy to introduce and simple to operate. Although the system as set out here is applicable to the individual hospital, it is readily adaptable to multi-hospital application.

II. Scope

The Memorandum describes a system of planned preventive maintenance for engineering plant and services in hospitals. It gives a step by step description of how to plan such a system for a hospital, and the Appendix gives examples of the forms, manuals, charts, etc., required to construct and operate the system.

III. General considerations

The object of a planned preventive maintenance system is to keep plant and services in good operating condition at all times.

Some of the benefits of such systems are:

even spread of the engineering maintenance work load over the year, making for more positive calculation of staff requirements and better budgetary control;

fewer emergency situations arising from breakdowns;

extension of the working life of the plant.

The system described is one designed to achieve in the first instance the basic objective set out in the first paragraph of this section. Refinements which are a valuable adjunct to systems of planned maintenance, e.g., unit cost control, store stock control, plant histories, etc., can however be added later if desired, when the essential elements of the system are fully operative.

The inclusion of a service in this system should not be taken as implying that it is necessarily the responsibility of the engineering department and that existing arrangements of a different type should therefore be altered.

IV. Main ingredients of the scheme

These are:

A. An inventory of all plant and services in the hospital which:

(*a*) classifies the plant and services and arranges these in sections having common servicing requirements.

(*b*) divides the hospital into sections comprising "packets" of work of a size which suit the particular hospital's planned maintenance scheme. (This is explained later.)

Suggested classifications for (*a*) are shown in parts 1 and 2 of the Appendix. It will be noted that each section is numbered, and is prefixed E for the electrical and M for the mechanical services. The section letters and numbers identify these services throughout the scheme.

A. (*continued*)

The procedure under (*b*) must be decided locally for the particular hospital.

Besides making conveniently sized work packets, the division should form readily identifiable units. A ward for example forms an easily identified basic unit as, indeed, do all departments outlined in the Building Note series. Thus a district general hospital with, say, 20 wards, might have besides these, 30 other departments, making a total of 50 departments in all.

B. An assessment of the man hours required per year for the several trades.

C. The dividing of the total annual work load calculated in B into 48 weeks of approximately equal work content.

D. The creation of a simple and easily adaptable system of progress and control.

E. Job specifications for the tradesmen in the form of mechanics' manuals which indicate the various services to be carried out.

V. Field survey sheets

To facilitate the work of surveying the plant and equipment, field survey sheets have been produced (parts 4, 5, 6 and 7 of the Appendix). These list the commonly found items under their index sections. To carry out the survey only the actual number of each item in the room or rooms of the department visited is entered. The spare lines under each index section on the field survey sheet are for items additional to those printed.

Not all index sections are printed on the field survey sheets. The sections omitted are the larger plant items which, it is recommended, are entered up directly on the equipment schedules dealt with in the following section.

It is recommended that two officers of supervisory grade carry out the survey as a team, one to note the electrical items, the other to note the mechanical items. As an approximation of the time required, a typical department can be surveyed in two hours, thus if the team do only one department a day, the 50 departments mentioned in section IV. A can be completed in ten weeks.

VI. Schedules (and plant history sheets)

These schedules form the permanent inventory, and there is one for each of the classified sections. They are printed to facilitate the entry of the plant items in the section (for specimens see parts 8 and 9 of the Appendix). It is recommended that the result of the field survey is transferred to the schedules as soon as possible following the survey, preferably on the same day.

A plant history sheet is available (see part 10 of the Appendix). This form is optional in that it plays no part in the service operation; its function is to enable a record to be kept of expenditure on selected items of plant if required.

VII. Time calculation sheets

A time calculation sheet (see part 11 of the Appendix) is made out for each schedule incorporating every item of the schedule. Reference is made to the various operations outlined in the manuals by the use of the appropriate manual section and paragraph number.

A time is estimated for carrying out the service specified in each relevant paragraph of the manual section (except when the service is carried out by contract). The hospital engineer should adapt the servicing specifications to the particular plant as necessary.

Guidance on carrying out the time estimate is given in paragraphs 59–61 of Hospital Technical Memorandum No. 12 on Maintenance of Buildings, Plant and equipment. Allowance should be made for unavoidable non-productive time. These provisional estimates should be checked in due course in the light of experience.

The estimated time is multiplied by the " number off " and entered on the right-hand side of the time calculation sheet under the appropriate paragraph number.

The times are totalled at the bottom of the columns, rounded up to the nearest $\frac{1}{4}$ hour. It is to be noted that times are cumulative, i.e. when an item requires a weekly service taking, say, 1 hour, a three weekly taking an additional 2 hours, and a yearly requiring an additional 6 hours, these visits are always coincidental. Thus the weekly takes 1 hour, the 3 weekly takes 3 hours and the yearly 9 hours. These cumulative totals are entered on the next line of the sheet. See parts 14–21 of the Appendix for examples of completed forms.

The frequencies of inspection and servicing are a matter for local decision, but the details shown in the mechanics' manuals are suggested for use at the outset until actual experience with the plants at

individual hospitals indicates that other frequencies will be better. Assuming this, the frequency, denoted by one of the code letters:

W	for weekly
T	„ three weekly
S	„ six weekly
Q	„ quarterly
H	„ half-yearly
Y	„ yearly

is copied from the manual and entered under the corresponding paragraph number on the next line; this is done for easy reference at a later stage.

The next line, i.e. "Week number of least frequent service", is left to a later stage of planning, as is the following line (see section VIII).

The bottom line repeats the manual paragraph numbers for easy reference.

At this stage it is desirable to add up the total committed hours for the year on the sheet; this is done by taking:

$$(W \times 52) + (T \times 16) + (S \times 8) + (Q \times 4) + (H \times 2) + Y = \text{total hours}$$

and writing the total in the box at the bottom right-hand corner of the sheet. When all the time calculation sheets are completed, it is then possible to deduce the number of tradesmen required to operate the scheme.

In addition to the total time requirements calculated above, it is necessary to allow a margin of time so that unexpected difficulties and breakdowns can be dealt with without seriously disturbing the programmed maintenance. Allowance must also be made in the estimates for absences due to holidays and sickness.

This margin is introduced in two ways. The scheme assumes that a year contains only 48 weeks of 40 hours and that the numbers of mechanical and electrical tradesmen will in each instance be rounded off to the nearest whole number above, or one whole man added, as experience indicates is necessary.

Proceeding on this basis, the aggregated hours of all the mechanical and of all the electrical tradesmen's time calculation sheets are each divided by 1,920 (hours per year), giving the number of fitters and electricians respectively required, these figures then being adjusted as above.

The total calculated hours should in each case also be divided by 48, which will give the approximate "committed hours per week", figures which will be required for the next stage of planning.

At this stage also it is appropriate to take stock of the changes in present staff complements which the estimates may indicate are necessary.

VIII. The annual programme

The next step is the preparation of the annual programme on the planning and progress chart. A reduced reproduction of part of a chart is shown in part 12 of the Appendix; the actual chart is $41\frac{1}{2}$ ins. $\times$ 24 ins.

A preliminary pencil draft of the programme should be prepared (see part 13 of the Appendix) in which the frequency symbol and the associated time calculation for each service is entered. When the draft copy has been completed to the satisfaction of the planner a final copy should be made using indian ink and omitting the time calculation. Charts are to be printed on two classes of paper; the heavier quality paper should be used for the final version.

The specimen charts in parts 12 and 13 of the Appendix show that the departmental names are entered in the left-hand column, followed by one line of each mechanics' manual section in that department. Separate charts are used for the mechanical and electrical services; the reproduction shows the mechanical services. It is recommended that two or three spare lines per department are left on the final copy to allow for any new equipment purchased not falling within one of the manual sections already entered for that department.

The fourth column, marked "index section number", cannot be completed at this stage and should be left blank.

Before commencing to plan the work some general points should be borne in mind:

(i) To reduce dislocation of the work of departments and achieve maximum utilisation of tradesmen's time, it is desirable that both mechanical and electrical trades should visit a department at the same time, and all items in the department due for service should be serviced at the same visit.

(ii) The reproduction of a draft work programme shows that the heaviest work load for any department occurs at the "yearly" service, coinciding as it does with all the subordinate frequencies. Thus the planner should always start by placing the yearly symbols first and should then develop the work away from these points.

(iii) The "yearly" service in most departments may involve shutting down the electrical and mechanical services for a limited period. It is recommended, therefore, that the "yearly" service for ward units is arranged for the summer months.

(iv) For planning purposes a central boiler house is considered to be a department.

Each steam boiler requires a yearly service in preparation for insurance inspection, and as these services are not generally coincident each boiler is given a separate line on the chart. The labour for this service may represent a substantial portion of that available,

and this should be borne in mind when placing the yearly services of other departments.

Consideration of the reproduction of the draft programme, part 13 of the Appendix, will show, for example, that in the second department listed, **Maternity and Plant Room,** the yearly services have been planned for week 25. The time calculation sheets for this department are reproduced in parts 14 to 21 of the Appendix.

Taking the first sheet, **Heating Installation M2** (part 14 of the Appendix), it will be seen that a yearly service of 14 hours and a half-yearly service of 1½ hours are required.

The "Y" is entered under week 25 on the draft programme with the 14 hours beneath the diagonal, and the "H" is entered under week 51 with the 1½ hours beneath the diagonal. (To facilitate the placing of the subordinate frequencies relative to the yearly service, a mechanical aid, as pictured in part 22 of the Appendix, could be used. It consists of a ruler, so marked that by placing the "Y" under the square selected for the yearly service all the subordinate frequencies are automatically indicated. The sliding strip numbered 1 to 51 below the frequencies can be moved so that the end lines coincide with the end lines of the chart, the week numbers can then be read without running the eye to the top or bottom of the chart, thus reducing the risk of errors.)

The second sheet is entered, which is **Domestic H. & C.W. services M3** requiring a yearly service only, taking 9½ hours.

The third sheet is entered which is **Kitchen equipment M6,** requiring a quarterly service only, taking 4 hours. Using the mechanical aid, if one quarter is aligned with the yearly service, the other quarters fall automatically in place.

The work shown on the fourth sheet, **Fire fighting equipment M8,** is in this case carried out by contract. The same procedure for placing the symbols is followed but no time allocation is required since this time is not part of the engineer's commitment.

The fifth sheet is **Air conditioning plant M11.** This requires yearly, half-yearly, quarterly, six-weekly and weekly services, requiring 59 hours, 21 hours, 20 hours, 6½ hours and 4 hours respectively, and these are entered as shown on the specimen.

At this point it will be noted that week numbers 13, 26, 39 and 52 have been taken out of the body of the chart and extended on the extreme right-hand side. No services, other than "weeklies", are planned in these four weeks, which allows some leeway for finishing uncompleted jobs and also makes it possible for the remaining 48-week cycle to repeat yearly.

The successive sheets M16, M19 and M21 are entered in similar fashion and the committed hours for the department are totalled at the bottom of each column containing a symbol, as shown on the reproduction.

A line is then ruled across the chart and the next department is entered up. The cumulative committed hours for each week in the year are recorded at the end of each department until the final overall totals are shown at the end of the last department.

The approximate committed hours per week calculated at the end of the previous stage (section VII) should be treated as a target, so that when all departments are entered, the individual weeks' totals are within plus or minus 10 per cent of this figure.

As each time calculation sheet is entered on the chart, the line marked "week no. of least frequent service" (i.e. generally the yearly service) can now be completed on the time calculation sheet. This information will be required in the next stage.

It is appropriate at this stage to mention that where a service is lightly used due to seasonal conditions, omissions may be made in the frequency of servicing. For example, in some departments it may be possible to omit shade cleaning during the summer quarter. In this case, the "Q" symbol is omitted from that line of the chart, one quarter of the yearly time allocation for that service is subtracted from the total on that time calculation sheet, and the week number on which the service would have been due is entered on the penultimate line of the time calculation sheet.

When the draft programme is completed to the satisfaction of the planner, the final copy should be made. It should be wall mounted in either the hospital engineer's office or preferably in a room set aside as the planned maintenance office. It should be framed and covered with clear acetate sheet, which can be marked with a chinagraph pencil to show progress, as will be described later. Two possible methods of hanging the framed charts are shown in the Appendix, part 23; the method chosen will depend on the number of sheets required and the available wall space.

IX. The 'Bring Up' card index

It is now possible to identify the work to be done week by week simply by standing in front of the charts and looking down the appropriate week's column, reading off the frequency symbol against the department and service. With a large number of departments and services, however, a simpler and more efficient method is to construct a "bring up" card index.

A standard 8 ins. × 5 ins. card suitable for this purpose is shown in part 24 of the Appendix.

A mechanical aid for completing the "bring up" card is shown in part 25 of the Appendix. This aid is designed with a central 5 ins. wide strip recessed to enable the "bring up" card to be located between the two outer rows of symbols.

A card is required for each completed line of the

chart. It is convenient to make out the cards using the time calculation sheets which contain all the information needed.

Refer now to the time calculation sheets shown for the maternity department in parts 14 to 21 of the Appendix, and take for example a sheet having several frequencies, e.g. the air conditioning M11.

When the week number of the least frequent service had been decided during the planning stage, that week number was entered on the time calculation sheet. The reason for this will now be explained.

In the case selected the least frequent service is yearly and this was fixed for week no. 25. The " bring up " card is therefore placed into the marker and week no. 25 positioned under the " Y " symbol, as shown. This symbol is then marked on the card in the box under week no. 25. The time calculation sheet is examined again; the next less frequent service is half-yearly, so an " H " symbol should be marked on the card opposite the " H " on the marker. The next service in this order is quarterly, so opposite the " Q " symbols on the marker a " Q " is noted in the corresponding boxes. These will be seen to fall in weeks 12 and 38. We cannot put a " Q " in week no. 25 or 51 because a " Y " and " H " respectively have already been inserted and, as previously explained, when doing any major service the subordinate services are automatically done as well. The next service in the same order is six-weekly, so the symbol " S " is inserted opposite the " S " symbols on the marker. There now remains only the weekly service and all the remaining week number boxes should be completed with a " W ".

The mechanics' manual references can now be completed as follows: the manual section is M11, paragraph number 1 is weekly, therefore a " W " is inserted under 1; paragraph 2 is six-weekly, therefore " S " is inserted under 2; paragraph 3 is quarterly, therefore a " Q " is inserted under 3; paragraph 4 is half-yearly, therefore an " H " is inserted under 4; and paragraph 5 is yearly, therefore " Y " is inserted under 5. The service is " air conditioning plant ", the department is " maternity ". There are no biennial or triennial services, so the " year of first service " box is left unmarked. An account code number can be inserted if departmental costing is practised. The type of labour will be either **Direct or contract;** if the latter, the contract reference should be inserted.

The only item which must be left uncompleted on this side of the card at this stage is the box marked **Check list,** reference will be made to this later. (See Section XIII.)

On the reverse side of the card (Appendix, part 24) it will be seen that there is a box marked **Index section no.** The symbol of the *most frequent service* should be marked there with the lowest week number upon which any service falls. In the case of the card that we have just considered, it will be " W " for weekly and 1 for week number one, i.e. W1.

The other box **Section serial number** cannot be completed until all the cards in that section have been completed. They should then be numbered in normal progression, e.g. 1, 2, 3, 4, etc., and the complete section serial number, e.g. W1/1 or W1/20, as the case may be, is entered under the **Index section no.** column on the planning and progress chart.

Ninety-four index dividing cards are now required and these should be marked as follows:

W1,

T1, T2, T3,

S1, S2, S3, S4, S5, S6,

Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12,

H1, H2, H3, H4, H5, H6, H7, H8, H9, H10, H11, H12, H14, H15, H16, H17, H18, H19, H20, H21, H22, H23, H24, H25,

Y1, Y2, Y3, Y4, Y5, Y6, Y7, Y8, Y9, Y10, Y11, Y12, Y14, Y15, Y16, Y17, Y18, Y19, Y20, Y21, Y22, Y23, Y24, Y25, Y27, Y28, Y29, Y30, Y31, Y32, Y33, Y34, Y35, Y36, Y37, Y38, Y40, Y41, Y42, Y43, Y44, Y45, Y46, Y47, Y48, Y49, Y50, Y51.

The " bring up " cards in our maternity department example will then go into the index section as follows:

Heating installation	M2	goes	into	index	section	H25
Domestic h. & c.w.	M3	„	„	„	„	Y25
Kitchen equipment	M6	„	„	„	„	Q12
Fire fighting equipment	M8	„	„	„	„	Y25
Air conditioning plant	M11	„	„	„	„	W1
Sterilisers	M16	„	„	„	„	S6
Medical gases & suction	M19	„	„	„	„	T3
Bedpan washers	M21	„	„	„	„	S6

All the " bring up " cards for the complete yearly plan will fall similarly into one of the 94 sections.

X. The 'Bring Up' calendar

The " bring up " card index described in the previous section is operated in conjunction with a " bring up " calendar. The calendar is reproduced in part 26 of the Appendix and, like the programme, it repeats in yearly cycles.

It is essential that the date column is commenced with the first Monday of the second week in April and successively every Monday thereafter. It will be found that the omission of the 13th, 26th, 39th, and 52nd weeks as previously mentioned will ensure

that all the months contain 4 weeks, as shown on the annual programme.

The object of the calendar is to ensure that whoever makes out the planned maintenance work dockets (see next section) will take the appropriate " bring up " cards from the index.

Take for example week No. 6 on the calendar:

Under column W read No. 1, i.e. cards in index section W1 are to be " brought up ";

Under column T read No. 3, i.e. cards in index section T3 are to be " brought up ";

Under column S read No. 6, i.e. cards in index section S6 are to be "brought up ";

Under column Q read No. 6, i.e. cards in index section Q6 are to be " brought up ";

Under column H read No. 6, i.e. cards in index section H6 are to be " brought up ";

Under column Y read No. 6, i.e. cards in index section Y6 are to be " brought up ".

Now refer back to Section IX, where it was shown into which index sections the cards in the **maternity department** would be placed. In week No. 6 the following cards will have been drawn from the index among those listed above:

Air conditioning	M11
Sterilisers	M16
Medical gases	M19
Bedpan washers	M21

A check of the planning and progress chart week 6, maternity department, will confirm that these four items are in fact due for service in this particular week.

XI. The work docket

Work dockets should be written up by a clerical officer from the " bring up " cards. As a guide to the time involved in this duty, a 300-bed teaching hospital requires approximately 50 dockets per week and these can be written by a clerical officer on one half-day per week. Work dockets are printed in duplicate pads. Referring back to the completed " bring up " card in part 25, and also to the specimen work docket in part 27 of the Appendix, the information to be written on the work docket is:

a serial number	—	arranged locally
date of issue	—	could be a date stamp
building or dept.	—	as already written on " bring up " card.

The next space, mechanic's name, is left for the engineer or foreman to insert.

The next space is to contain the coded instruction; in this case refer to the " bring up " card and write the manual reference:

M11

and the appropriate manual paragraph numbers.

On this particular " bring up " card, if week no. 25 were under consideration, this would be the week that the yearly service occurs. It will be seen that in the Manual Reference box paragraph 5 relates to frequency Y, and as already stated when this service is done the subordinate services should be carried out as well, therefore the manual paragraphs on this docket are 1, 2, 3, 4, and 5. The completed manual service to be written in this space is:

M11/1, 2, 3, 4, and 5.

If the week under consideration had been week no. 12, the quarterly service would have been indicated and the work docket coded instruction would have been:

M11/1, 2, and 3.

For week no. 10, the weekly service only would have been indicated and the coded instruction would have been:

M11/1.

The docket is then ready for issue except for the insertion of the check list number. This will be explained in section XIII.

XII. Mechanics' manuals

Job specifications are needed for instructing the mechanic which service operation he is to carry out and at what intervals. These should be grouped using the classification prepared in accordance with paragraph IV A (*a*) and will be contained in mechanics' manuals. (A specimen section of one proposed by the Ministry is shown in the Appendix, part 3.) One manual for electrical services and another for mechanical services are needed. Both manuals can be prepared in a form suitable for work carried out by direct labour or by contract and produced in loose leaf form so that sections can conveniently be added or subtracted. Where it is necessary to give more detailed instructions than are printed in the manual, e.g. manufacturers instruction sheets, these should be mounted, protected, and fixed in the plant room or housing.

The introductory pages of the manuals define the delegated responsibility of the tradesmen, and show how to read the coded instruction given on the work docket. (Section XI.)

Each mechanic should be issued with a manual appropriate to his trade and each supervisory grade will have access to both electrical and mechanical manuals.

XIII. The equipment check list

At this stage it is useful to consider one further card that has not so far been mentioned as it is an optional addition to the basic scheme. This is the equipment check list (see Appendix, part 28).

This can be used where a department contains several pieces of similar equipment, for example where a department has, say, four portable suction pumps. A mechanic might be sent to service them (M19/1) and having serviced two be recalled for some reason or be absent from duty. It would be necessary to record which two of the four pumps had been serviced, and to this end it is suggested that each of the pumps be numbered and the four pumps entered on the card as shown in the specimen. This card is given the same section serial number as its associated " bring up " card and filed in a separate card index divided in similar fashion to the " bring up " index. This serial number is also entered in the box marked **Check list** on the " bring up " card.

When making out a work docket for any card bearing a check list number, this number should be inserted in the box provided on the docket.

The check list is given to the tradesman with the work docket, and each piece of equipment is ticked as it is dealt with. Then if he should be interrupted for any reason, a record remains of the items so far serviced.

Other uses are possible, e.g. for portable electrical appliances stored in cupboards or loaned to other departments; use of the check list will ensure that the equipment is located by the tradesman or reported as missing.

XIV. Departmental notification slips

One of the obstacles sometimes met in efforts to carry out planned maintenance is the difficulty of obtaining access to departments. A notification slip should be sent to the head of a department giving a week's notice of a service visit. A suggested form of notification slip is reproduced in part 29 of the Appendix. The clerk has only to insert the name of the head of the department, the date of the week in which the visit will take place and the equipment concerned. The form includes a section for the recipient to insert an alternative date.

Before commencing the operation of a planned maintenance scheme it is suggested that secretaries send a memorandum to heads of departments explaining the objectives of the scheme and asking for their co-operation in its implementation.

XV. Operational procedure

The foregoing completes the setting up of the scheme; this section deals with the operation.

For the purpose of the scheme it is convenient to take a week as commencing Monday morning and, as previously noted, the date on the " bring up " calendar should be successive Mondays.

Take, for example, the action required for week no. 6:

Action by clerical officer

(i) On the Thursday of week no. 4, draw from the " bring up " index cards required for week no. 6, as detailed in paragraph X.

(ii) Make out work dockets and put these in a folder.

(iii) Make out departmental notification slips, not in respect of every docket, but for every department due for service in week no. 6. These slips should be despatched forthwith, i.e. giving a clear week's notice.

(iv) Hand to the engineer the work dockets and check lists for week no. 5 (which would have been made out the previous week).

Action by the hospital engineer

(i) On Thursday of week no. 5, receive from the clerical officer the work dockets in respect of week no. 6.

(ii) Check each one against the programme chart, making a diagonal stroke across the symbol on the chart with a chinagraph pencil, and noting the extent of the following week's work, i.e. any particularly difficult items that may require his personal attention.

(iii) Hand the dockets to assistant engineers or trade foremen with any observations about particular items as in (ii) above.

(iv) On the Monday of week no. 6, receive completed dockets from the assistant engineers or trade foremen in respect of week no. 5, completing the cross stroke on the programme chart for that week and making arrangements for any " follow-up " action required as noted on the dockets.

Action by the assistant engineers or trade foremen

(i) On Thursday of week no. 5, receive from the engineer the work dockets and check lists in respect of week no. 6, and draw from the

check list index any cards required (some check lists may already be in use).

(ii) Plan the following week's work, so that trades visit the same departments at the same time and men are sent to the jobs suited to their capabilities (where applicable).

(iii) On the Monday of week no. 6, ensure that all dockets and check lists for week no. 5 have been returned, examine them for completion, time taken, follow up required, and return the dockets to the hospital engineer. The check lists should be re-issued if again required, or returned to the index.

(iv) If departmental costing is practised, the dockets may be sent to the accounts department for entry, after which they should be returned to the engineer, filed in weekly order for, say twelve months, and then destroyed.

XVI. Conclusion

The system has been described in this Memorandum step by step to facilitate understanding of the procedures in its setting up and subsequent operation. Part 30 of the Appendix illustrates this diagrammatically. Guidance from those trained in the system is available either from the Ministry or from the Regional Hospital Board.

The introduction of planned maintenance will probably mean greater pressure of work on the engineering department in the first year, but thereafter the pressure will be less than before and the benefits of an organised system of maintenance will amply repay the effort of introducing it.

Part 31 of the Appendix lists the forms, manuals and markers to be used in the system. Supplies of these are available to Regional Hospital Boards, Boards of Governors, and Hospital Management Committees from:

The Chief Engineer,
Ministry of Health,
Engineering "A" (Planned Maintenance)
Alexander Fleming House,
LONDON, S.E.1.

SECTION E 1 Electrical installations, fittings and accessories.

E 2 Portable equipment (not permanently connected).

E 3 Fixed apparatus (permanently connected).

E 4 Kitchen, bakery and laboratory equipment.

E 5 Bell, buzzer and staff location installations.

E 6 Alarm systems.

E 7 Battery plant (secondary cells).

E 8 Motors, generators, starting and regulating equipment.

E 9 Portable workshop equipment.

E 10 Electrical distribution (medium, low voltage and road lighting).

E 11 Electric lifts.

E 12 Radio and television.

E 13 Oil-firing equipment.

E 14 Electrically-powered office equipment.

E 15 Electro-medical equipment.

E 16 Private telephone installations.

E 17 Refrigerators.

E 18 Electric trucks.

E 19 Sterilising and ancillary equipment.

E 20 Medical gases, suction, incubators and breathing apparatus.

E 21 Bedpan washer, disinfector or destructor.

E 22 Installations and equipment in operating suites and other anaesthetising areas.

SECTION M 1 Boilers and boiler house plant (heating and steam raising).

M 2 Heating installations (excluding boilers).

M 3 Domestic hot water and cold water services, including boilers and calorifiers.

M 4 Solid fuel heating appliances.

M 5 Gas services and appliances.

M 6 Kitchen, bakery and laboratory equipment.

M 7 Ventilation and dust extraction plant.

M 8 Fire-fighting equipment.

M 9 Workshop equipment.

M 10 Diesel and petrol engines.

M 11 Air-conditioning plant and installation.

M 12 Compressed air plant.

M 13 Bore holes and artesian wells.

M 14 Sewage plant.

M 15 Pneumatic tube systems.

M 16 Sterilising and ancillary equipment.

M 17 Laundry equipment.

M 18 Water softening plant.

M 19 Medical gases and suction.

M 20 Medical furniture.

M 21 Bedpan washer, disinfector or destructor.

M 22 Physiotherapy equipment.

M 23 Hand-operated lifts, hoists, cranes, tackle and other lifting devices.

MECHANICS MANUAL

SECTION M 11
AIR CONDITIONING PLANT AND INSTALLATION

No.		*Frequency symbol*
1	FILTERS Examine dry and oil film type. Check manometer reading. Wash down electrostatic filters. AIR WASHERS AND HUMIDIFIERS Examine spray nozzles and strainer. Check dribble to waste. Change water if recirculated only and dose with germicide as necessary. PUMPS Lubricate bearings as necessary.	W
2	FILTERS (*a*) Dry filters: renew 33 per cent or 50 per cent by rotation according to district or as required. (*b*) Oil film type: replace 33 per cent or 50 per cent by rotation of cleaned units. Examine oil level in reservoir, desludge and renew oil as necessary.	S
3	AIR GRILLES Clean all air grilles and check settings. HEATERS Examine and clean pre- and after-heaters. Examine connections to heating elements for leaks. Check steam traps and clean strainer. Check modulating valve seats. WASHERS Examine washer tank, spray piping and flood header for leaks. Hose down washer and eliminator plates or pads. Clean strainer on spray pump unit. Examine and clean ball valve and ensure water flows evenly over eliminator plates. FANS Check drive for alignment wear and tension. Lubricate bearings as necessary. AUTOMATIC CONTROLS Check all auto-operated control valves. Ensure manometric readings are accurate. Calibrate, set and check for winter or summer working. Check thermostatic control of chilled water. PUMPS Check drive for alignment wear and tension. Lubricate bearings as necessary. Examine pump glands and valves for leaks and re-pack as necessary.	Q
4	FANS Check all pulleys and keys and ensure that all holding down and casing bolts are secure. Test dampers and control for free working and re-set in original positions. Lubricate as necessary. DUCTING Test motorised dampers and controls for free working. Lubricate as necessary. COMPRESSORS AND REFRIGERATION PIPEWORK Check all pulleys and keys. Check drive for alignment wear and tension, and ensure that holding down and other bolts are secure. Test joints, stop valve covers and crankshaft seals for leaks by approved methods. Check refrigerant pressures. Check oil levels in crank case. Check pipework, valves, supports and insulation of refrigeration pipework, and chilled water storage.	H

SECTION M 11 (contd.)

No.		*Frequency symbol*
	FORCED DRAUGHT EVAPORATING CONDENSERS Check drive for alignment wear and tension. Lubricate bearings, and check fan blading. Test joints, stop valve covers and glands for leaks by approved methods.	H
	SHELL AND TUBE CONDENSERS Test joints, stop valve covers and glands for leaks by approved methods.	
	EVAPORATORS Examine water distribution over cooling coils and check for defrosting. Test joints, stop valve covers for leaks.	
	TESTS—OPERATING THEATRE SUITE Make volumetric tests of total and local air flow. Check air flow between different parts of suite.	
5	AIR WASHERS Remove stand pipes complete with nozzles. Clean pipes internally and externally and apply protective coating. Remove nozzles, clean and replace. Examine all door gaskets and renew as necessary. Clean all metal work on washer and apply protective coating.	Y
	FANS Check all working parts for wear and mechanical condition. Clean and apply protective coating to blades, internal and external surfaces of casing. Renew flexible connections as necessary.	
	AUTOMATIC CONTROLS Overhaul valves and examine spindles and seatings for wear.	
	DUCTING Clean inside of ducting and examine all joints and seams and treat with germicide where possible. Report on condition of external trunking. Examine insulation, and repair as necessary.	
	PUMPS Overhaul pumps, and check working parts for wear and mechanical condition.	

FIELD SURVEY SHEET

HOSPITAL..... Date of Survey.....

BUILDING/WARD/DEPARTMENT .....

Description	Number Off	Total
Electrical Installation, Section E 1		
Lighting Switches		
Flexed Pendants		
Tungsten Fittings		
Fluorescent Fittings		
Flexible-arm Fittings		
X-ray Viewers		
Special Fittings		
2-amp Socket Outlets		
5-amp Socket Outlets		
13-amp Socket Outlets		
15-amp Socket Outlets		
30-amp Socket Outlets for X-ray		
Switchfuses, Single Phase		
Switchfuses, Three Phase		
Fuseboards, Single Phase		
Fuseboards, Three Phase		
Portable Equipment, Section E 2 (not permanently connected and not covered under special section)		
Boiling Rings		
Bedpan Washers		
Counters		
Centrifuge		
Electric Clocks		
Electric Heater, Fan		
Electric Heater, Radiant		
Electric Heater, Tubular		
Electric Heater, Convector		
Electric Heater, Control Switches		
Electric Heater, Thermostats		
Extension Leads		
Floor Polisher		
Floor Scrubber		
Heat Pads		
Heated Food Trolleys		
Hand Lamps, Mains		
Hand Lamps, Battery		
Hair Dryers		
Kettles		
Microscope Lights		
Table Fans		
Toasters		
Vacuum Cleaners		
Fixed Equipment, Section E 3 (not covered under special sections)		
Bedpan Warmer		
Drying Cupboard		
Electric Heaters, Fan		
Electric Heaters, Radiant		
Electric Heaters, Tubular		
Electric Heaters, Convector		
Electric Heaters, Control Switches		
Electric Heaters, Thermostats		
Incinerators		
Water Heaters		

Description	Number Off	Total
Kitchen, Bakery and Laboratory Equipment, Section E 4		
Dish Washers		
Grillers		
Mixers		
Potato Peelers		
Slicing Machines		
Bell, Buzzer and Staff Location Installation, Section E 5		
Batteries		
Bells		
Buzzers		
Pushes		
Indicators		
Transformers		
Motors, Generators, Starters, Regulators, Section E 8		
Extract Fans		
Extract Fans Controllers		
Radio and Television, Section E 12		
Radio Sets		
Television Sets		
Wired Radio Outlets with L/S or Head Sets		
Electro-Medical Equipment, Section E 15		
Infra-Red Lamps		
Refrigerators, Cold Rooms and Mortuaries, Section E 17		
Sterilising and Ancillary Equipment, Section E 19		
Instrument, Boiling Type		
Bowl, Boiling Type		
Medical Gases, Suction, Incubators and Breathing Apparatus, Section E 20		
Portable Suction Pumps		
Central Suction Pumps		
Bedpan Washers and Disinfectors and Destructors, Section E 21		

FIELD SURVEY SHEET

HOSPITAL..... Date of Survey.....

BUILDING/WARD/DEPARTMENT.....

DESCRIPTION	NUMBER OFF	TOTAL
Heating Installation (excluding Boilers), Section M 2		
Radiators, L.P.H.W.		
Radiators, Steam		
Heating Coils		
Heater Batteries		
Unit Heaters		
Radiator Valves		
Circuit Control Valves		
Reducing Valves		
Automatic Air Vents		
Steam Traps and Strainers		
Valves, Steam and Condensate		
Expansion Joints		
Feed and Expansion Tanks		
Pressure Gauges		
Safety Valves		
Domestic Hot and Cold Water Services, including Boilers and Calorifiers, Section M 3		
Hot Water D.O. Points		
Towel Rails		
Cold Water D.O. Points		
Cold Water Storage Tanks		
Stop Cocks		
Isolating Valves		
Calorifiers		
Pumps		
Steam Trap Assembly		
Thermostatic Valves		
Steam and Condensate Valves		
D.H.W. Storage Tanks/Cylinders		
Gas Services, Section M 5		
Incinerators		
Fires		
Convectors		
Laboratory Gas Points		
Control Valves and Taps		
Gas Rings		
Water Heaters		
Kitchen, Bakery and Laboratory Equipment, Section M 6		
Gas Cookers		
Hot Plates, Gas		
Boiling Tops		
Water Boilers, Gas		
Water Boilers, Steam		
Dish-washing Machines		
Steam Traps and Strainers		
Control Valves		
Mixing Machines		
Bottle Washers		

Description	Number Off	Total
Ventilation and Dust Extraction Plant, Section M 7		
Filters, Dry		
Filters, Oil Film Type		
Dampers		
Fans, Inlet		
Fans, Exhaust/Extract		
Fire-Fighting Equipment, Section M 8		
Injectors and Fire Pumps		
Fire Mains		
Hose Reels		
Hydrants, External		
Hydrants, Internal		
Valves		
Hoses		
Extinguishers		
Air Conditioning Plant, Section M 11		
Filters, Dry		
Filters, Oil Film Type		
Pre-Heaters		
After-Heaters		
Washers		
Inlet Fans		
Extract Fans		
Pumps		
Compressors		
Condensers		
Evaporators		
Steam Traps and Strainers		
Steam and Condensate Valves		
Control Valves		
Sterilising and Ancillary Equipment, Section M 16		
Sterilisers, H.S.H.V.		
Autoclaves		
Boiling Type, Steam		
Boiling Type, Electric		
Boiling Type, Gas		
Medical Gases and Suction, Section M 19		
Central Plant		
Pumps Vacuum		
Valves		
Gauges		
Portable Vacuum Pumps		
Oxygen Tents		
Portable Oxygen Trolleys		
Medical Furniture, Section M 20		
Bedpan Washers, Disinfectors or Destructors, Section M 21		

PREVENTIVE MAINTENANCE SCHEDULE.

HOSPITAL. MANUAL SECTION E1

WARD/BUILDING. DATE SURVEYED.

ELECTRICAL INSTALLATION.

TYPE OF INSTALLATION

DESCRIPTION	No. OFF.
Lighting Switches.	
Flexed Pendants with or without shades	
Tungsten Fittings, Rod Chain Ceiling or Wall mounted	
Fluorescent Fittings	
Flexible arm Fittings including Table Lamps Anglepoise etc	
X-Ray Viewers	
Special Fittings	
2 amp Socket Outlets Switched or otherwise	
5 amp Socket Outlets " "	
13 amp Socket Outlets " "	
15 amp Socket Outlets " "	
30amp Socket Outlets for X-Ray Equipment	
Switchfuses Single Phase	
Switchfuses Two or Three Phase	
Fuse Boards Single Phase	
Fuse Boards Two or Three Phase	
Busbars (Rising Main)	

DISTRIBUTION

Brief description of Main Panel.

Type of Distribution . Main to Sub main panels or boards.

Type of Submain Panels or Boards.

Type of Distribution Submain panels or boards to final Sub-circuit Boards.

D5.68806/5(1)/3575. 360 10/62 XL

PREVENTIVE MAINTENANCE SCHEDULE

HOSPITAL ..... MANUAL SECTION **M11**

BUILDING/DEPARTMENT ..... DATE SURVEYED .....

AIR-CONDITIONING PLANT AND INSTALLATIONS

TYPE OF INSTALLATION .....

.....

.....

TYPE OF CONTROL SYSTEM .....

.....

.....

FILTERS

Description	No. Off	Remarks and Location

FANS

Description	No. Off	Remarks and Location

PUMPS

Description	No. Off	Remarks and Location

APPENDIX

FURTHER PARTICULARS OF PLANT

Description	No. Off	Remarks and Location
WASHER		
HEATERS		
COMPRESSOR		
EVAPORATOR		
CONDENSER		
CONTROL SYSTEM		
DUCTWORK AND DAMPERS		
ADDITIONAL ITEMS OF PLANT		

APPENDIX

PLANT HISTORY

PLANT IDENTIFICATION No.

BUILDING / DEPARTMENT

SUPPLIED & INSTALLED BY

DATE INSTALLED | COST £

MANUFACTURER

DESCRIPTION OF PLANT AND ANCILLARY EQUIPMENT.

H.M.C. No.	DESCRIPTION	TYPE	MANUFACTURERS SERIAL No.	ADDITIONAL TECHNICAL DATA / REMARKS

REPAIRS AND REPLACEMENTS

DATE	H.M.C. No.	DESCRIPTION	COST OF MATERIAL	COST OF LABOUR	TOTAL

PREVENTIVE MAINTENANCE TIME CALCULATION

HOSPITAL .....

BUILDING/DEPARTMENT .....

MANUAL SECTION .....

MANUAL REFERENCE .....

No. Off	Item	Estimated Man Hours to Carry Out Respective Manual Paragraph Nos.									
		1	2	3	4	5	6	7	8	9	10

APPENDIX

MINISTRY OF HEALTH. ENGINEERING DIVISION.
SECTION ENG. A.

PREVENTIVE MAINTENANCE PLANNING AND PROGRESS CHART

HOSPITAL ST. GEORGE'S.

SHEET NO.

BUILDING DEPARTMENT	SERVICE	MANUAL SECTION NO	INDEX SECTION NO	APRIL 1	2	3	4	MAY 5	6	7	8	JUNE 9	10	11	12	JULY 14	15	16	17	AUGUST 18	19	20	21	SEPTEMBER 22	23	24	25	OCTOBER 27	28	29	30	NOVEMBER 31	32	33	34	DECEMBER 35	36	37	38	JANUARY 40	41	42	43	FEBRUARY 44	45	46	47	MARCH 48	49	50	51	WEEKLY FREQUENCIES ONLY FOR WEEK. NOS. 13	26	39	52
BOILER HOUSE	BOILERS & B H PLANT	M1	W1-1	H	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	H	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
	BOILER No 8334	M1	Q7-1							Y												Q											Q											Q														
	BOILER No 8335	M1	Q2-2		Q												Y											Q											Q																
	BOILER No 8336	M1	Q8-2								Q												Y									Q											Q												
	OIL FIRING EQUIPT	M1	W1-2	W	W	W	W	Y	W	W	W	W	W	S	W	W	W	W	W	S	W	W	W	W	W	S	W	W	W	W	W	S	W	W	W	W	W	S	W	W	W	S	W	W	W	W	W	S	W	W	W	W	W
	HEATING INSTALLATION	M2	Y9-1									Y																																											
	DOMESTIC H.& C.W. INSTLN	M3	H14-1													Y																							H																
MATERNITY AND PLANT ROOM	HEATING INSTALLATION	M2	H25-1																								Y																							H				
	DOMESTIC H.& C.W. INSTLN	M3	Y25-1																								Y																											
	KITCHEN EQUIPT	M6	Q12-1												Q												Q											Q												Q				
	FIRE FIGHTING EQUIPT	M8	Y25-2	CONTRACT																							Y																											
	AIR CONDITIONING EQUIPT	M11	W1-3	W	W	W	W	W	S	W	W	W	W	W	Q	W	W	W	W	W	S	W	W	W	W	W	Y	W	W	W	W	W	S	W	W	W	W	W	Q	W	W	W	W	W	S	W	W	W	W	H	W	W	W	W
	STERILISERS	M16	S6-1						S						Q						S						Y						S					Q									S				H				
	MEDICAL GASES & SUCTION	M19	T3-2			T			T			T			T			T			T			T			T			T			T			T			T			T			T			T			T			
	BED PAN WASHERS	M21	S6-3						S						S						S						H						S					S									S				H				
OUT PATIENTS	HEATING INSTALLATION	M2	Y4-1				Y																																															
	DOMESTIC H.& C.W. INSTLN.	M3	Y4-2				Y																																															
	KITCHEN EQUIPT	M6	T1-1	T			Q			T			T			T			Q			T			T			T			Q			T			T			T			Q			T			T			T			
	FIRE FIGHTING EQUIPT	M8	Y25-3	CONTRACT																							Y																											
	AIR CONDITIONING EQUIPT	M11	W1-4	W	W	W	Y	W	W	W	W	W	S	W	W	W	W	W	S	W	W	W	W	W	S	W	W	W	W	W	W	W	W	W	W	W	S	W	W	W	W	W	W	W	S	W	W	W	W	S	W	W	W	W
	STERILISERS	M16	S4-1				Y						S						Q						S						H						S						Q						S				
	MEDICAL GASES & SUCTION	M19	T1-2	T			T			T			T			T			T			T			T			T			T			T			T			T			T			T			T			
MAIN KITCHEN	HEATING INSTALLATION	M2	H3-1		H																						Y																											
	DOMESTIC H.& C.W. INSTLN.	M3	Y29-1																								Y																											
	GAS SERVICES	M5	Y29-2	CONTRACT																							Y																											
	KITCHEN EQUIPMENT	M6	T3-1		Q			T			T			T			Q			T			T			T			Y			T			T			T			Q			T			T			T			

MINISTRY OF HEALTH. ENGINEERING DIVISION.
SECTION ENG. A.

PREVENTIVE MAINTENANCE PLANNING AND PROGRESS CHART

HOSPITAL ST. GEORGE'S.

SHEET NO.

BUILDING DEPARTMENT	SERVICE	MANUAL SECTION NO	INDEX SECTION NO	APRIL 1	2	3	4	MAY 5	6	7	8	JUNE 9	10	11	12	JULY 14	15	16	17	AUGUST 18	19	20	21	SEPTEMBER 22	23	24	25	OCTOBER 27	28	29	30	NOVEMBER 31	32	33	34	DECEMBER 35	36	37	38	JANUARY 40	41	42	43	FEBRUARY 44	45	46	47	MARCH 48	49	50	51	WEEKLY FREQUENCIES ONLY FOR WEEK. NOS. 13	26	39	52
Boiler House.	Boilers and B.H. Plant.	M.1.	W1-1	W/26	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	H/26	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8	W/8
	Boiler No. 8334.	M.1.	Q7-1							Y/40												Q/24												Q/24									Q/24											
	Boiler No. 8335.	M.1.	Q2-2		Q/24											Y/40												Q/24												Q/24											
	Boiler No. 8336.	M.1.	Q8-2								Q/24											Y/40											Q/24									Q/24											
	Oil Firing Equipment.	M.1.	W1-2	W/12	W/12	W/12	W/12	W/12	W/12	W/12	W/12	W/12	W/12	S/17	W/12	W/12	W/12	W/12	W/12	S/17	W/12	W/12	W/12	W/12	W/12	S/17	W/12	W/12	W/12	W/12	S/17	W/12	W/12	W/12	W/12	W/12	S/17	W/12	W/12	W/12	W/12	W/12	W/12	W/12	W/12	S/17	W/12	W/12	W/12	W/12	W/12	W/12	W/12
	Heating Installation	M.2.	Y9-1									Y/5																																									
	Domestic H. & C.W. Instln.	M.3.	H14-2													Y/57																								H/2													
				38	44	20	20	37	20	60	44	25	20	25	20	77	60	20	20	25	20	44	60	20	20	25	20	38	44	20	20	25	20	44	44	20	20	25	20	22	44	20	20	25	20	44	44	20	20	25	20	20	20	20	20
Maternity and Plant Room.	Heating Installation	M.2.	H25-1																							Y/14																								H/12							
	Domestic H. & C.W. instln.	M.3.	Y25-1																							Y/12																															
	Kitchen Equipment.	M.6.	Q12-1												Q/4											Q/4														Q/4											Q/4							
	Fire Fighting Equipt.	M.8.	Y25-2	Contract.																						Y																															
	Air Conditioning Equipt.	M.11.	W1-3	W/4	W/4	W/4	W/4	W/4	S/6½	W/4	W/4	W/4	W/4	W/4	Q/20	W/4	W/4	W/4	W/4	W/4	S/6½	W/4	W/4	W/4	W/4	W/4	Y/39	W/4	W/4	W/4	W/4	W/4	S/6½	W/4	W/4	W/4	W/4	Q/20	W/4	W/4	W/4	W/4	W/4	S/6½	W/4	W/4	W/4	W/4	W/4	H/21	W/4	W/4	W/4	W/4
	Sterilizers	M.16.	S6-1						S/4						Q/10						S/4						Y/16						S/4						Q/10						S/4						H/12				
	Medical Gases & Suction	M.19.	T3-2			T/4			T/4			T/4			T/4			T/4			T/4			T/4			T/4			T/4			T/4			T/4			T/4			T/4			T/4			T/4			T/4			T/4	
	Bed Pan Washers	M21	S6-3						S/2						S/2						S/2						H/10						S/2						S/2						S/2						H/10				
				42	48	28	24	41	36½	64	48	33	24	29	60	81	64	28	24	29	36½	48	64	28	24	29	136½	42	48	28	24	29	36½	48	48	28	24	29	60	26	48	28	24	29	36½	48	48	28	24	29	72½	24	24	24	24
Out Patients	Heating Installation	M.2.	Y4-1				Y/90																																															
	Domestic H. & C.W. Instln.	M.3.	Y4-2				Y/8½																																														
	Kitchen Equipment.	M.6.	T1-1	T/½			Q/3½		T/½			T/½				T/½			Q/3½		T/½			T/½			T/½			Q/3½		T/½			T/½			T/½			Q/3½		T/½			T/½			T/½				
	Fire Fighting Equipt.	M.8.	Y25-3	Contract.																						Y.																															
	Air Conditioning Plant	M.11.	W1-4	W/½	W/½	W/½	Y/21	W/½	W/½	W/½	W/½	W/½	S/32	W/½	W/½	W/½	W/½	W/½	S/32	W/½	W/½	W/½	W/½	W/½	S/32	W/½	W/½	W/½	W/½	W/½	S/32	W/½	W/½	W/½	W/½	W/½	S/32	W/½	W/½	W/½	W/½	W/½	S/32	W/½	W/½	W/½	W/½	W/½	S/32	W/½	W/½	W/½	W/½
	Sterilizers.	M.16.	S4-1				Y/30						S/1						Q/27						S/1						H/29						S/1						Q/27						S/1						
	Medical Gases & Suction	M.19.	T1-2	T/3½			T/3½			T/3½			T/3½			T/3½			T/3½			T/3½			T/3½			T/3½			T/3½			T/3½			T/3½			T/3½			T/3½			T/3½			T/3½				
				47½	49½	29½	28½	42½	38	69½	49½	34½	61	30½	61½	86½	65½	29½	90	30½	38	53½	65½	29½	61	30½	138	47½	49½	29½	92	30½	38	53½	49½	29½	61	30½	61½	31½	49½	29½	90	30½	38	53½	49½	29½	61	30½	74	25½	25½	25½	25½
Main Kitchen	Heating Installation	M.2.	H3-1			H/10																								Y/30																								
	Domestic H. & C.W. instln.	M.3.	Y29-1																											Y/7½																								
	Gas Services	M.5.	Y29-2	Contract.																										Y																								
	Kitchen Equipment.	M.6.	T3-1			Q/29			T/5			T/5			T/5			Q/29			T/5			T/5			T/5			Y/44			T/5			T/5			T/5			Q/29			T/5			T/5			T/5				
				47½	49½	68½	28½	42½	43	69½	49½	39½	61	30½	66½	86½	65½	58½	90	30½	43	53½	65½	34½	61	30½	143	47½	49½	114	92	30½	43	53½	49½	34	61	30½	66½	31½	49½	58½	90	30½	43	53½	49½	34½	61	30½	79	25½	25½	25½	25½

PREVENTIVE MAINTENANCE TIME CALCULATION

HOSPITAL

BUILDING / DEPT *Maternity and Plant room.*

MANUAL SECTION *M 2.*

MANUAL REFERENCE *Heating Installation.*

No. OFF	ITEM	ESTIMATED MAN HOURS TO CARRY OUT RESPECTIVE MANUAL PARAGRAPH NOS.									
		1	2	3	4	5	6	7	8	9	10
25	Radiators L.P.H.W.			2							
1.	Steam radiator			½							
2	Heating Coils			½							
52	Radiator Valves.	Included with radiators.									
9	Circuit Control Valves			1							
22	Steam and Condensate Valves			1							
1	Reducing Valve assembly		½	1							
2	Automatic air Vents.			½							
6	Steam trap assemblies.		1	6							
TOTAL ESTIMATED HOURS			1½	12½							
TOTAL CUMULATIVE HOURS			1½	14							
FREQUENCY			H	Y							
WEEK No. OF LEAST FREQUENT SERVICE				25							
WEEK No. FOR OMISSIONS											
MANUAL PARAGRAPH NOS.		1	2	3	4	5	6	7	8	9	10

COMMITTED HOURS PER YEAR **15½.**

PREVENTIVE MAINTENANCE TIME CALCULATION

HOSPITAL

BUILDING / DEPT *Maternity and Plant room.*

MANUAL SECTION *M3.*

MANUAL REFERENCE *Domestic hot and cold water services.*

No. OFF	ITEM	ESTIMATED MAN HOURS TO CARRY OUT RESPECTIVE MANUAL PARAGRAPH NOS.									
		1	2	3	4	5	6	7	8	9	10
51.	Domestic H.W. D.O. points.				4						
62	Cold water D.O. points				4						
113	Slip locks.	Included with D.O. Points									
11	Isolating Valves.										
2	Cold water storage tanks				1½.						
2	Ball float Valves.										
4	Isolating Valves.										
TOTAL ESTIMATED HOURS					9½						
TOTAL CUMULATIVE HOURS					9½						
FREQUENCY					Y						
WEEK No. OF LEAST FREQUENT SERVICE					25						
WEEK No. FOR OMISSIONS											
MANUAL PARAGRAPH NOS.		1	2	3	4	5	6	7	8	9	10

COMMITTED HOURS PER YEAR **9½.**

PREVENTIVE MAINTENANCE TIME CALCULATION

HOSPITAL

BUILDING / DEPT *Maternity and Plant room.*

MANUAL SECTION *M6*

MANUAL REFERENCE *Kitchen Equipment.*

No. OFF	ITEM	ESTIMATED MAN HOURS TO CARRY OUT RESPECTIVE MANUAL PARAGRAPH NOS.									
		1	2	3	4	5	6	7	8	9	10
1.	Gas heated hot plate				1						
1	Gas boiling top (2 burners)										
1	Gas heated water boiler (MAXOL)				3						
1	Gas ring.										
	TOTAL ESTIMATED HOURS				4						
	TOTAL CUMULATIVE HOURS				4						
	FREQUENCY				Q						
	WEEK No. OF LEAST FREQUENT SERVICE				12						
	WEEK No. FOR OMISSIONS										
	MANUAL PARAGRAPH NOS.	1	2	3	4	5	6	7	8	9	10

COMMITTED HOURS PER YEAR **16**

PREVENTIVE MAINTENANCE TIME CALCULATION

HOSPITAL

BUILDING / DEPT *Maternity and Plant room.*

MANUAL SECTION *M 8.*

MANUAL REFERENCE *Fire Fighting equipment*

No. OFF	ITEM	ESTIMATED MAN HOURS TO CARRY OUT RESPECTIVE MANUAL PARAGRAPH NOS.									
		1	2	3	4	5	6	7	8	9	10
3	*Portable fire extingrushers*	*Contract*									

PREVENTIVE MAINTENANCE TIME CALCULATION

HOSPITAL

BUILDING / DEPT *Maternity and Plant room.*

MANUAL SECTION *M 11.*

MANUAL REFERENCE *Air Conditioning plant.*

No. OFF	ITEM	ESTIMATED MAN HOURS TO CARRY OUT RESPECTIVE MANUAL PARAGRAPH NOS.									
		1	2	3	4	5	6	7	8	9	10
2	Banks dry filters	1	2½								
6	Extract fans (1 plenum extract)			6	½	16					
1.	Plenum input fan.			1½	½	16					
1	Air washer	2		1½		3					
1	water pump	1		½							
2	Air heater batteries			3							
2	Satchwell Controls.			1		3					
TOTAL ESTIMATED HOURS		4	2½	13½	1	38					
TOTAL CUMULATIVE HOURS		4	6½	20	21	59					
FREQUENCY		W	S	Q	H	Y					
WEEK No. OF LEAST FREQUENT SERVICE						25					
WEEK No. FOR OMISSIONS											
MANUAL PARAGRAPH NOS.		1	2	3	4	5	6	7	8	9	10

COMMITTED HOURS PER YEAR **322**

PREVENTIVE MAINTENANCE TIME CALCULATION

HOSPITAL

BUILDING / DEPT *Maternity and Plant room.*

MANUAL SECTION *M 16*

MANUAL REFERENCE *Sterilisers.*

No. OFF	ITEM	ESTIMATED MAN HOURS TO CARRY OUT RESPECTIVE MANUAL PARAGRAPH NOS.									
		1	2	3	4	5	6	7	8	9	10
2	*Steam heated Sterilisers*			2	3	2	2				
2	*Electrically heated Sterilisers*			2	3		2				

PREVENTIVE MAINTENANCE TIME CALCULATION

HOSPITAL

BUILDING / DEPT *Maternity and Plant room.*

MANUAL SECTION *M19.*

MANUAL REFERENCE *Medical Gases and Suction.*

No. OFF	ITEM	ESTIMATED MAN HOURS TO CARRY OUT RESPECTIVE MANUAL PARAGRAPH NOS.									
		1	2	3	4	5	6	7	8	9	10
4	oxygen outlet points.	Contract B.O.C.									
1	Master Valve.										
4	Vacuum points.										
4	portable Vacuum pumps.	4									

PREVENTIVE MAINTENANCE TIME CALCULATION

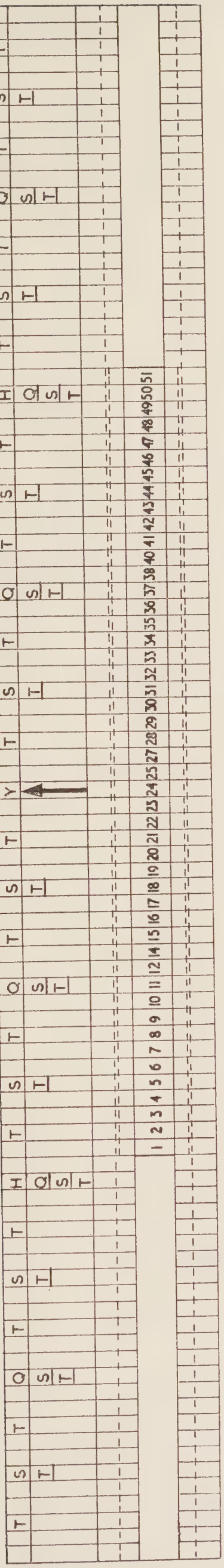
HOSPITAL

BUILDING / DEPT *Maternity and Plant room.*

MANUAL SECTION *M 21.*

MANUAL REFERENCE *Bed Pan washers.*

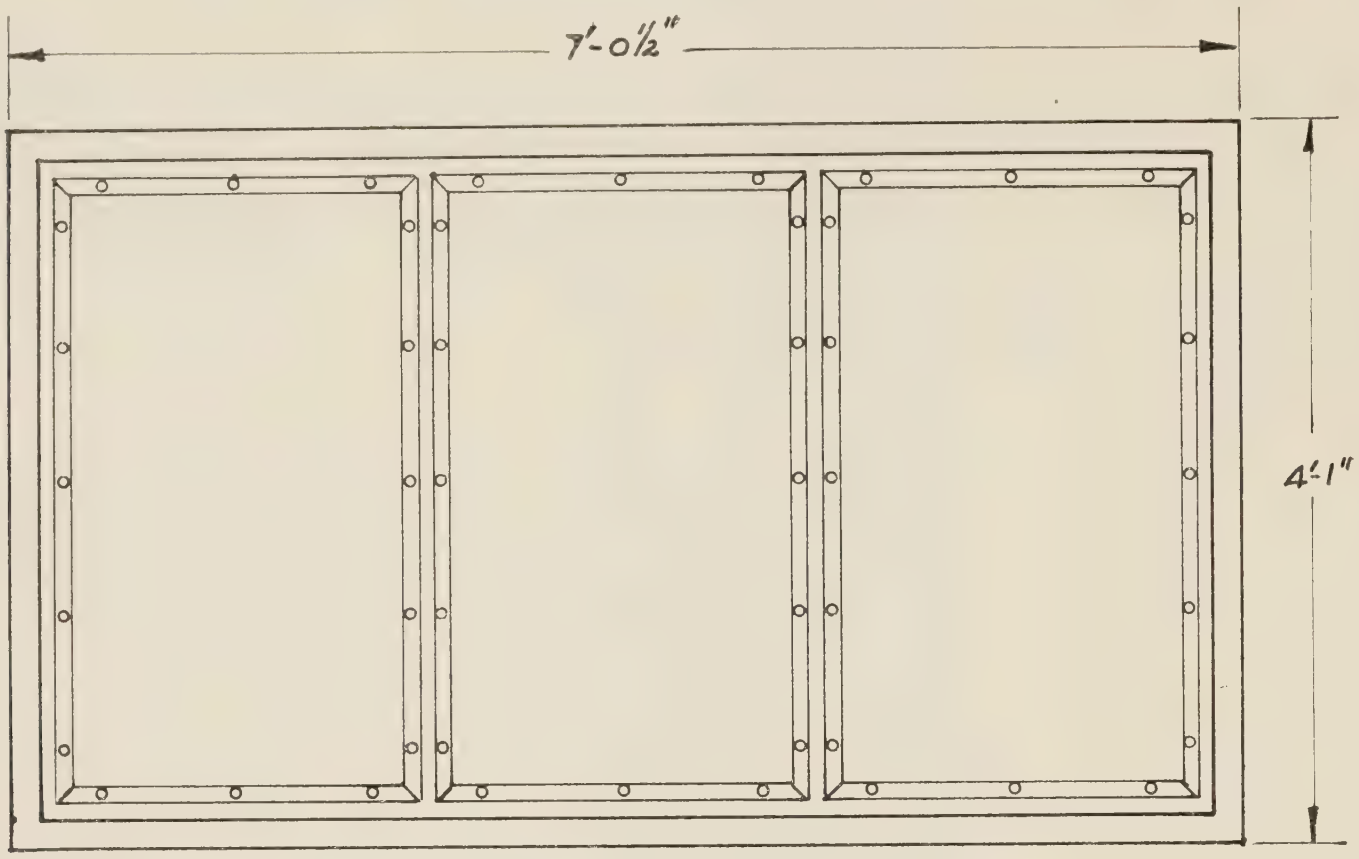
No. OFF	ITEM	ESTIMATED MAN HOURS TO CARRY OUT RESPECTIVE MANUAL PARAGRAPH NOS.									
		1	2	3	4	5	6	7	8	9	10
2	*Bed pan washers.*	2	8								



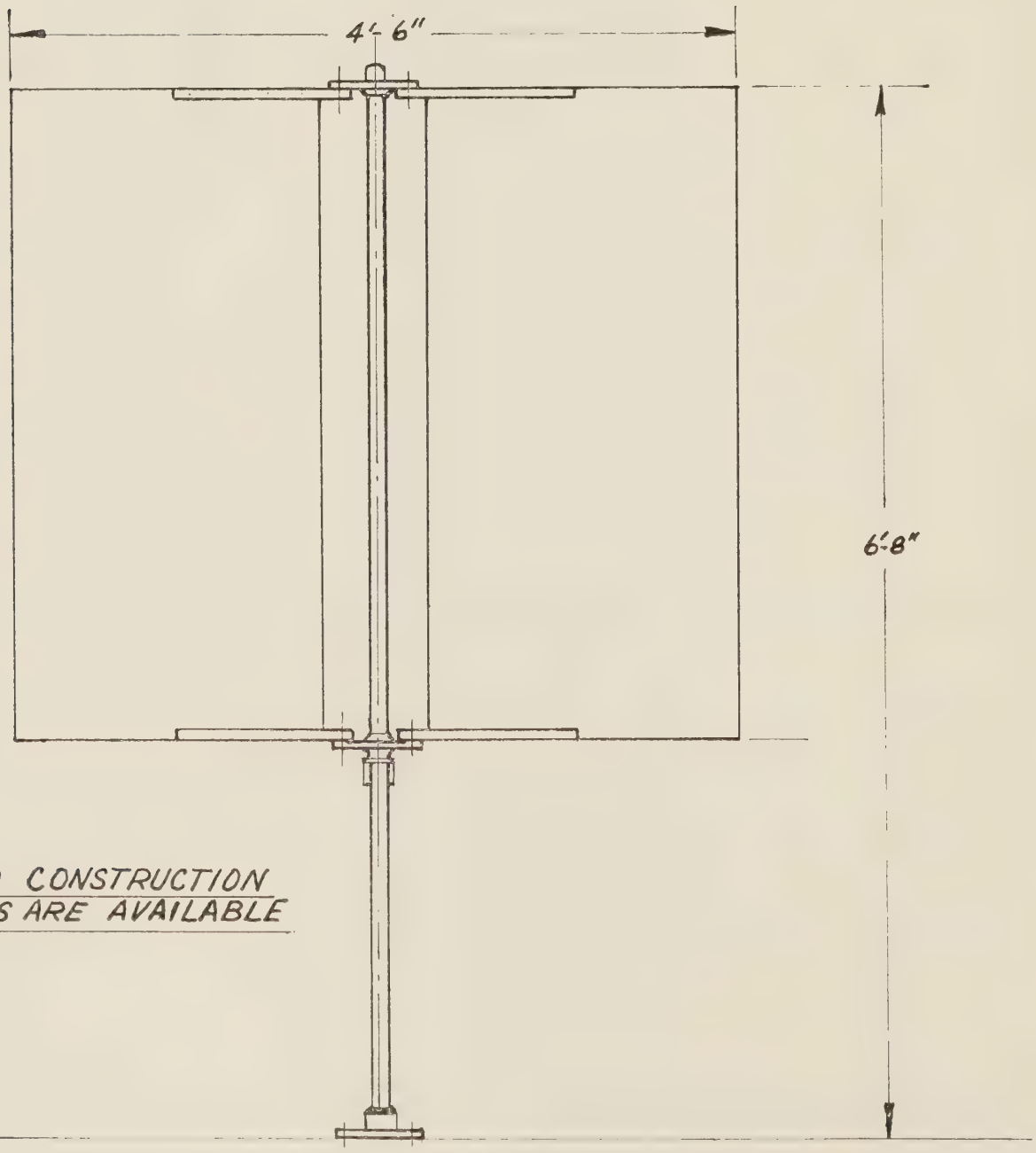
MARKER

REDUCED IN SIZE

METHODS OF MOUNTING PLANNING AND PROGRESS CHARTS.



WALL MOUNTED FRAME.



NOTE

DETAILED CONSTRUCTION DRAWINGS ARE AVAILABLE

PEDESTAL MOUNTED FRAME

BRING UP CARD

WEEK NUMBERS AND FREQUENCY																								ENG PM G/4
1	2	3	4	5	6	7	8	9	10	11	12	14	15	16	17	18	19	20	21	22	23	24	25	

HOSPITAL & ADDRESS	YEAR OF FIRST A/___SERVICE_____	ACCOUNT CODE No. - - - - - - - - - - -
DEPARTMENT		CHECK LIST No. - - - - - - - - - - - -
SERVICE	TYPE OF LABOUR _____ CONTRACT No. _____	

MANUAL REFERENCES															
SECTION	PARAGRAPH No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	FREQUENCY														

	WEEK NUMBERS AND FREQUENCY																							
27	28	29	30	31	32	33	34	35	36	37	38	40	41	42	43	44	45	46	47	48	49	50	51	

FRONT OF CARD

INDEX SECTION No.	SECTION SERIAL No.

REAR OF CARD

ACTUAL SIZE OF CARD 8"X 5"

| | | |

PLANNED MAINTENANCE

BRING–UP CALENDAR

STANDARD FREQUENCY SYMBOLS

W — WEEKLY
T — 3 WEEKLY
S — 6 WEEKLY
Q — QUARTERLY
H — HALF YEARLY
Y — YEARLY

DATE	WEEK No	W	T	S	Q	H	Y	DATE	WEEK No	W	T	S	Q	H	Y
	1	1	1	1	1	1	1		27	1	1	1	1	1	27
	2	1	2	2	2	2	2		28	1	2	2	2	2	28
	3	1	3	3	3	3	3		29	1	3	3	3	3	29
	4	1	1	4	4	4	4		30	1	1	4	4	4	30
	5	1	2	5	5	5	5		31	1	2	5	5	5	31
	6	1	3	6	6	6	6		32	1	3	6	6	6	32
	7	1	1	1	7	7	7		33	1	1	1	7	7	33
	8	1	2	2	8	8	8		34	1	2	2	8	8	34
	9	1	3	3	9	9	9		35	1	3	3	9	9	35
	10	1	1	4	10	10	10		36	1	1	4	10	10	36
	11	1	2	5	11	11	11		37	1	2	5	11	11	37
	12	1	3	6	12	12	12		38	1	3	6	12	12	38
	13	1							39	1					
	14	1	1	1	1	14	14		40	1	1	1	1	14	40
	15	1	2	2	2	15	15		41	1	2	2	2	15	41
	16	1	3	3	3	16	16		42	1	3	3	3	16	42
	17	1	1	4	4	17	17		43	1	1	4	4	17	43
	18	1	2	5	5	18	18		44	1	2	5	5	18	44
	19	1	3	6	6	19	19		45	1	3	6	6	19	45
	20	1	1	1	7	20	20		46	1	1	1	7	20	46
	21	1	2	2	8	21	21		47	1	2	2	8	21	47
	22	1	3	3	9	22	22		48	1	3	3	9	22	48
	23	1	1	4	10	23	23		49	1	1	4	10	23	49
	24	1	2	5	11	24	24		50	1	2	5	11	24	50
	25	1	3	6	12	25	25		51	1	3	6	12	25	51
	26	1							52	1					

THE BRING UP CALENDAR SHOWS THE INDEX SECTIONS TO BE WITHDRAWN FOR ACTION EACH WEEK.

E.G. IN WEEK 16 SECTIONS W1. T3. S3. Q3. H16. Y16. ARE TO BE WITHDRAWN.

ENG. PM.G.6

PREVENTIVE MAINTENANCE

DOCKET No. 25/1.

DATE OF ISSUE. 23-9-63.

BUILDING / DEPT Maternity and Plant room.

MECHANICS NAME.

CARRY OUT THE FOLLOWING SERVICES:

M11/ 1, 2, 3, 4 and 5.

IN CONJUNCTION WITH CHECK LIST

ISSUED BY

MECHANIC'S REPORT

TIME TAKEN

MECHANIC'S SIGNATURE

DATE OF COMPLETION

ACTION BY ENGINEER

DATE SIGNATURE

EQUIPMENT CHECK LIST | ENG PM G/7

HOSPITAL AND ADDRESS

DEPARTMENT *Maternity* | SERVICE *Portable Suction Pumps*

ITEM NO.	DESCRIPTION	WEEK NO. OF INSPECTION															
		3															
M.D. 1	*Matburn*	✓															
M.D. 2	*Matburn*	✓															
M.D. 3	*Matburn*	✓															
M.D. 4	*Matburn*	✓															

FRONT OF CARD

SECTION SERIAL No. T3/2

ITEM NO.	DESCRIPTION	WEEK NO. OF INSPECTION															

REAR OF CARD

APPENDIX

Notification Slip

Dear

Planned Maintenance

It is proposed that members of the Engineer's staff will visit your department during the week commencing

..... to carry out maintenance work on .....

.....

.....

Will you please let me know if this is not convenient to you and suggest an alternative date

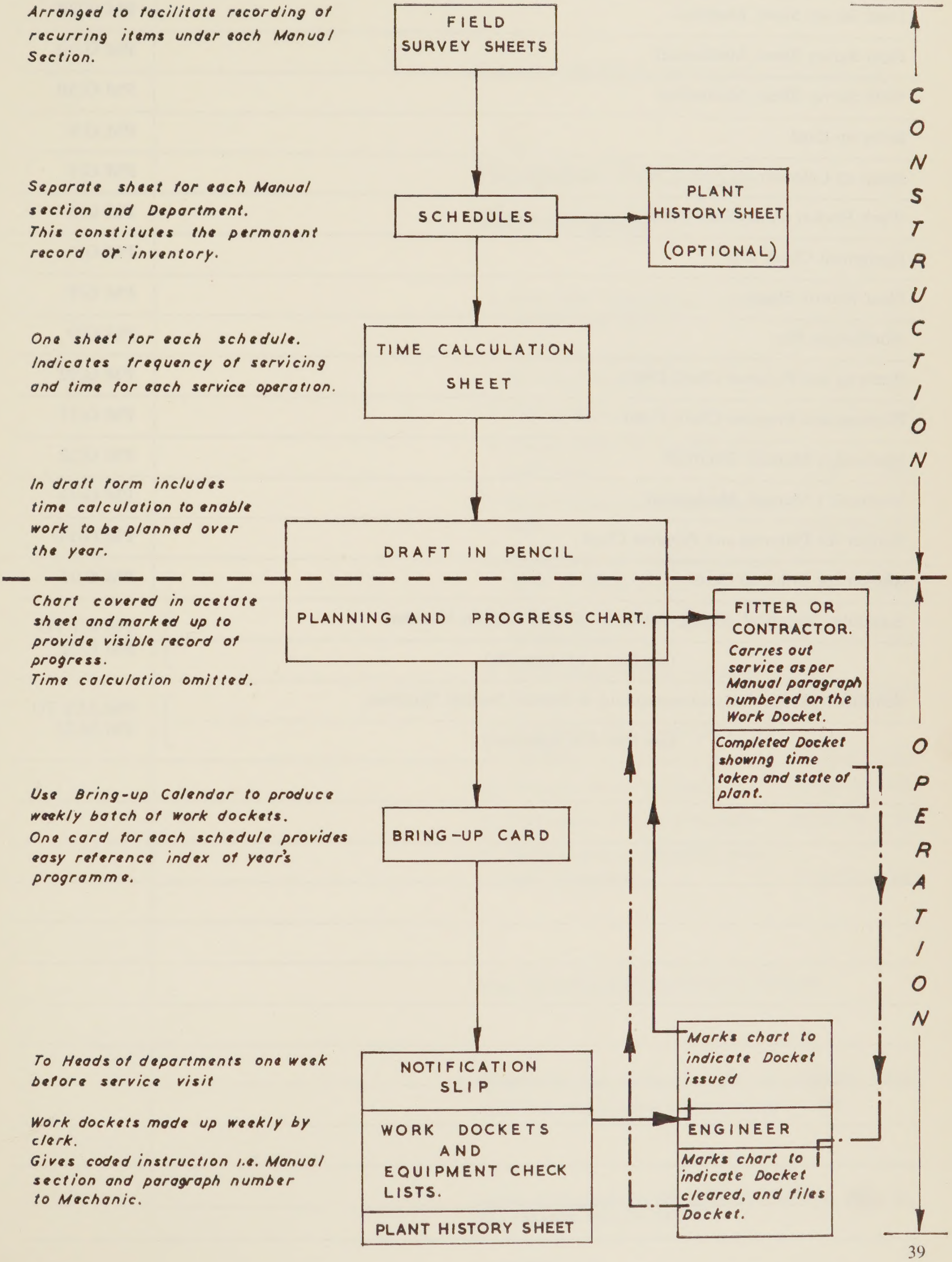
.....

Date.....

PREVENTIVE MAINTENANCE (ENGINEERING)

CONSTRUCTION AND OPERATION DIAGRAM

BASIC SCHEME


Arranged to facilitate recording of recurring items under each Manual Section.
FIELD SURVEY SHEETS
Separate sheet for each Manual section and Department. This constitutes the permanent record or inventory.
SCHEDULES
PLANT HISTORY SHEET (OPTIONAL)
One sheet for each schedule. Indicates frequency of servicing and time for each service operation.
TIME CALCULATION SHEET
In draft form includes time calculation to enable work to be planned over the year.
DRAFT IN PENCIL
Chart covered in acetate sheet and marked up to provide visible record of progress. Time calculation omitted.
PLANNING AND PROGRESS CHART.
FITTER OR CONTRACTOR.
Carries out service as per Manual paragraph numbered on the Work Docket.
Completed Docket showing time taken and state of plant.
Use Bring-up Calendar to produce weekly batch of work dockets. One card for each schedule provides easy reference index of year's programme.
BRING-UP CARD
To Heads of departments one week before service visit
Work dockets made up weekly by clerk. Gives coded instruction i.e. Manual section and paragraph number to Mechanic.
NOTIFICATION SLIP
WORK DOCKETS AND EQUIPMENT CHECK LISTS.
PLANT HISTORY SHEET
Marks chart to indicate Docket issued
ENGINEER
Marks chart to indicate Docket cleared, and files Docket.
CONSTRUCTION
OPERATION

PLANNED PREVENTIVE MAINTENANCE—STATIONERY

DESCRIPTION	FORM NO.
Time Calculation Sheet	PM G/1
Field Survey Sheet, Electrical	PM G/2A
Field Survey Sheet, Electrical	PM G/2B
Field Survey Sheet, Mechanical	PM G/3A
Field Survey Sheet, Mechanical	PM G/3B
Bring up Card	PM G/4
Bring up Calendar	PM G/5
Work Docket (*in duplicate pads*)	PM G/6
Equipment Check List	PM G/7
Plant History Sheet	PM G/8
Notification Slip	PM G/9
Planning and Progress Chart, Draft	PM G/10
Planning and Progress Chart, Final	PM G/11
Mechanic's Manual, Electrical	PM G/12
Mechanic's Manual, Mechanical	PM G/13
Marker for Planning and Progress Chart	PM G/14
Marker for Bring up Card	PM G/15
Schedules, Electrical, corresponding to Manual Section Numbers (*see Part 1 of Appendix*)	PM E/1 TO PM E/22
Schedules, Mechanical, corresponding to Manual Section Numbers (*see Part 2 of Appendix*)	PM M/1 TO PM M/23

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4.	Colour code of flexible cables and cords	6*d* (9*d*)
5.	Steam boiler plant instrumentation	1*s* 6*d* (1*s* 9*d*)
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